



New Jersey Department of Health and Senior Services

## HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **CYCLOTETRAMETHYLENE-  
TETRANITRAMINE**

CAS Number: 2691-41-0  
DOT Number: UN 0226 (Wetted)  
UN 0484 (Desensitized)

RTK Substance number: 0589  
Date: April 2004

### HAZARD SUMMARY

- \* **Cyclotetramethylenetetranitramine** can affect you when breathed in and may be absorbed through the skin.
- \* Contact can irritate the skin and eyes.
- \* Breathing **Cyclotetramethylenetetranitramine** can irritate the nose and throat.
- \* **Cyclotetramethylenetetranitramine** is a HIGHLY FLAMMABLE and REACTIVE CHEMICAL and a DANGEROUS FIRE and EXPLOSION HAZARD.

### IDENTIFICATION

**Cyclotetramethylenetetranitramine** is a colorless to white crystalline (sand-like) solid. It is used as a military explosive.

### REASON FOR CITATION

- \* **Cyclotetramethylenetetranitramine** is on the Hazardous Substance List because it is cited by DOT and IRIS.
- \* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE** and **REACTIVE**.
- \* Definitions are provided on page 5.

### HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

### WORKPLACE EXPOSURE LIMITS

No occupational exposure limits have been established for **Cyclotetramethylenetetranitramine**. This does not mean that this substance is not harmful. Safe work practices should always be followed.

- \* It should be recognized that **Cyclotetramethylenetetranitramine** can be absorbed through your skin, thereby increasing your exposure.

### WAYS OF REDUCING EXPOSURE

- \* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Cyclotetramethylenetetranitramine** and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Cyclotetramethylenetetranitramine** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Cyclotetramethylenetetranitramine**:

- \* Contact can irritate the skin and eyes.
- \* Breathing **Cyclotetramethylenetetranitramine** can irritate the nose and throat.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Cyclotetramethylenetetranitramine** and can last for months or years:

### Cancer Hazard

- \* According to the information presently available to the New Jersey Department of Health and Senior Services, **Cyclotetramethylenetetranitramine** has not been tested for its ability to cause cancer in animals.

### Reproductive Hazard

- \* According to the information presently available to the New Jersey Department of Health and Senior Services, **Cyclotetramethylenetetranitramine** has not been tested for its ability to affect reproduction.

### Other Long-Term Effects

- \* No chronic (long-term) health effects are known at this time.

## MEDICAL

### Medical Testing

There is no special test for this chemical. However, if illness occurs or overexposure is suspected, medical attention is recommended.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- \* Where possible, automatically transfer **Cyclotetramethylenetetranitramine** from drums or other storage containers to process containers.
- \* Before entering a confined space where **Cyclotetramethylenetetranitramine** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Cyclotetramethylenetetranitramine** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Cyclotetramethylenetetranitramine**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Cyclotetramethylenetetranitramine**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Cyclotetramethylenetetranitramine**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Cyclotetramethylenetetranitramine** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- \* Use a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Cyclotetramethylenetetranitramine**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Wear impact resistant eye protection with side shields or goggles.
- \* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- \* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
- \* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Cyclotetramethylenetetranitramine**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.

- \* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- \* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

## HANDLING AND STORAGE

- \* Prior to working with **Cyclotetramethylenetetranitramine** you should be trained on its proper handling and storage.
- \* **Cyclotetramethylenetetranitramine** may explode if exposed to SHOCK, FRICTION or HEAT.
- \* **Cyclotetramethylenetetranitramine** is not compatible with METAL SALTS (such as MERCURY FULMINATE) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
- \* Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLES.
- \* Do not move damaged containers.
- \* Sources of ignition, such as smoking and open flames, are prohibited where **Cyclotetramethylenetetranitramine** is used, handled, or stored.
- \* Metal containers involving the transfer of **Cyclotetramethylenetetranitramine** should be grounded and bonded.
- \* Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclotetramethylenetetranitramine**.
- \* Wherever **Cyclotetramethylenetetranitramine** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

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The following information is available from:

New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
Trenton, NJ 08625-0360  
(609) 984-1863  
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

#### **Industrial Hygiene Information**

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

#### **Medical Evaluation**

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

#### **Public Presentations**

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

#### **Right to Know Information Resources**

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

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## DEFINITIONS

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

**CFR** is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

CHEMTREC: (800) 424-9300  
NJDEP HOTLINE: 1-877-WARN-DEP

*Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe*

- \* **Cyclotetramethylenetetranitramine** is a **HIGHLY FLAMMABLE** and **REACTIVE EXPLOSIVE** which can be detonated by *heat, shock* or *friction*.
- \* Evacuate area and flood with water.
- \* **POISONOUS GASES ARE PRODUCED IN FIRE**, including *Nitrogen Oxides*.
- \* **CONTAINERS MAY EXPLODE IN FIRE**.
- \* Use water spray to keep fire-exposed containers cool.
- \* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

If **Cyclotetramethylenetetranitramine** is spilled, take the following steps:

- ## HANDLING AND STORAGE (See page 3)

**For POISON INFORMATION call 1-800-222-1222**

## Eye Contact

- \* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

## Skin Contact

- \* Remove contaminated clothing. Wash contaminated skin with soap and water.

## Breathing

- \* Remove the person from exposure.
- \* Transfer promptly to a medical facility.

## PHYSICAL DATA

**Flash Point:** Explosive

**Water Solubility:** Slightly soluble

## OTHER COMMONLY USED NAMES

**Chemical Name:**

1,3,5,7-Tetrazocine, Octahydro-1,3,5,7-Tetranitro-

### Other Names:

HMX; Octogen

*Not intended to be copied and sold for commercial purposes.*

NEW JERSEY DEPARTMENT OF HEALTH AND  
SENIOR SERVICES  
**Right to Know Program**  
PO Box 368, Trenton, NJ 08625-0368  
(609) 984-2202